

TeraStation III iSCSI User Manual



TS-IXL
TS-RIXL

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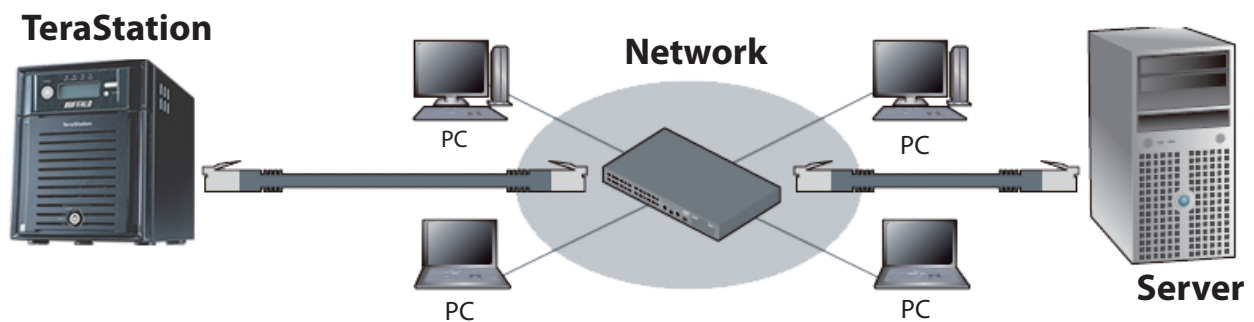
Chapter 1

Introduction

iSCSI

iSCSI Compatible Hard Drive

iSCSI (Internet Small Computer System Interface) is a standard to transmit data on an Ethernet network by encapsulating SCSI commands in TCP/IP protocol. Once the iSCSI drive is connected to the network by Ethernet cables, the drive is recognized as a local drive by computers or servers on the network.



This illustration shows a TS-IXL TeraStation. The rackmount TS-RIXL is functionally identical.

Can be placed anywhere

Since the drive is accessed through the network, you can place it anywhere (even far away from your computer) and it will still be recognized as a local hard disk.

Can be used as a local drive

Since it is recognized as a local drive, all features of your OS and applications can be used. You can format the drive with NTFS from within Windows.

Differences between NAS and iSCSI

iSCSI

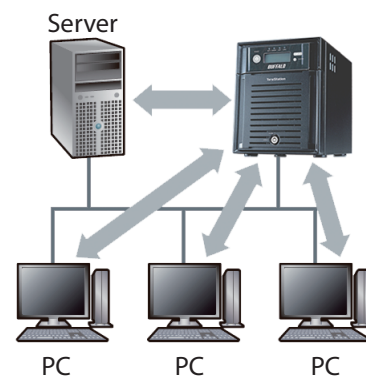
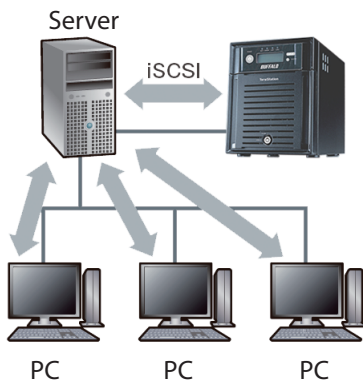
A server creates shared folders on the iSCSI drive, and computers can then access the created folders on the servers.

- Can be used as a local drive from Windows Server and accessed via the server by client computers.
- All standard Windows features such as Access Restrictions with Active Directory can be used on iSCSI drives.
- Database software that requires special formatting can be used with iSCSI drives.

NAS

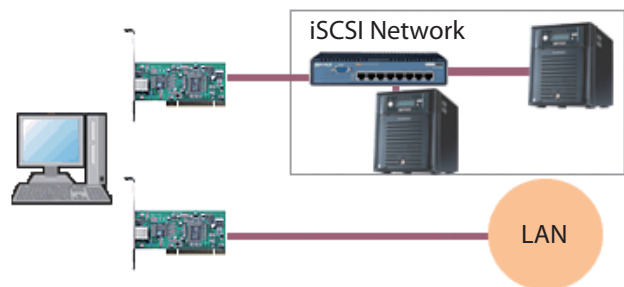
Servers and computers directly access shared folders on a NAS.

- Create and use shared folders easily (no extra server needed)
- Access files directly using XFS format.
- Features like backup are built in to the NAS.



Network Structure

For best results, use dedicated gigabit (1000BASE-T) NICs, cabling, and routers to connect iSCSI drives. Use of slower network equipment, or sharing a network with normal Ethernet traffic, will compromise performance.



Install the Microsoft iSCSI Software Initiator

Windows XP, Windows 2000, Windows Server 2003, Windows 2000 Server

Install Microsoft iSCSI Software Initiator first.

Before using iSCSI equipment with Windows XP, 2000, Server 2003, or 2000 Server, download and install Microsoft iSCSI Software Initiator.

1. Visit to Microsoft's web site (www.microsoft.com).
2. Search for Microsoft iSCSI Software Initiator.
3. Download the latest version of the Microsoft iSCSI Software Initiator.
4. When the download is complete, double-click on the installer. Check the Initiator Service and Software Initiator checkboxes. Follow the wizard to install.

Windows 8, Windows 7, Windows Vista, Windows Server 2008

If you're using Windows 8, Windows 7, Vista, or Windows Server 2008, the Microsoft iSCSI Software Initiator is already installed on your computer. You don't need to download and install it.

Setup

Notes:

- If there is a DHCP server in the network, the TeraStation will get an IP address from it automatically.
- Running the TeraNavigator software will automatically assign an unused IP address to a TeraStation.
- TeraNavigator can only automatically configure one unit at a time. To reconfigure a TeraStation with TeraNavigator after its initial installation, initialize the TeraStation first.
- If no DHCP server is available and TeraNavigator is not run, a random IP address of the form 169.254.xxx.xxx (where each xxx is a random number from 1 - 256) will be assigned to the TeraStation.

If you are using Windows 2000, XP, 2000 Server, or Server 2003, install Microsoft iSCSI Software Initiator before installing the TeraStation. Refer to previous page.

Refer to the separate Quick Setup Guide for connection instructions.



Turn on your computer.



Insert the Utility CD included in the package into the CD/DVD drive.



After TeraNavigator launches, follow the instructions on the screen.



Launch the iSCSI Connection Tool, click *Register iSCSI Device*, then *Connect*.

Adding multiple TeraStations

Run TeraNavigator separately for each iSCSI TeraStation.

Note: If no DHCP server is available on the network, an IP Address of the form 169.254.xxx.xxx (where each xxx is a random number from 1 - 256) is randomly assigned. Run TeraNavigator to configure the TeraStation automatically.

Chapter 2

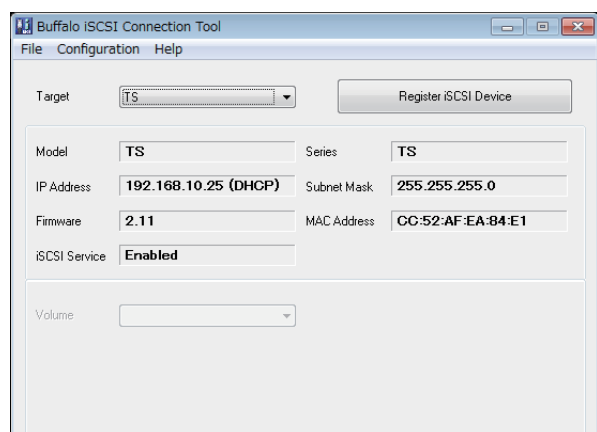
Using iSCSI Connection Tool

iSCSI Connection Tool

The iSCSI Connection Tool is automatically installed when you launch TeraNavigator, and you will use it to connect to TeraStation.

To launch:

Click *Start - All Programs - BUFFALO - iSCSI Connection Tool - iSCSI Connection Tool*.



For Windows 8, click the *iSCSI Connection Tool*.

Name	Descriptions
Target	Select a TeraStation from the drop-down list. All iSCSI TeraStation units on the LAN should be available. <i>Register iSCSI Device</i> registers all volumes of the selected TeraStation to your computer. If a TeraStation is already registered, click <i>Unregister iSCSI Device</i> to unregister all volumes of that TeraStation.
Model	TeraStation's model name
Series	TeraStation's series name
IP Address	TeraStation's IP address.
Subnet Mask	TeraStation's subnet mask.
MAC Address	TeraStation's MAC address.
Firmware	TeraStation's firmware version.
iSCSI Service	Displays the iSCSI service's current status (e.g. running, stopped).
Volume	Selects individual volumes from a registered TeraStation. Until the TeraStation is registered above, its volumes will not be visible. Once a volume has been selected, click <i>Connect</i> . The selected volume will be recognized as a local drive on your computer (under My Computer). If the volume is already connected, you can click <i>Disconnect</i> to disconnect it. Note that if IP address restrictions are set, volumes will only be displayed on computers with approved IP addresses.

Note:

If your computer is connected to many volumes on a TeraStation, it may take some time for the utility to detect all the volumes. For example, it takes about 20 minutes for a computer to detect 32 connected volumes from a single TeraStation. This time may vary depending on your computer and network. Volumes are detected successively, so please wait until all volumes are detected before making changes in the utility.

Status	<p>Displays Current status of the selected volume.</p> <ul style="list-style-type: none"> • <i>Disconnected</i>: Volume is disconnected. • <i>Connected</i>: Volume is connected. <p>* You must register TeraStation as an iSCSI hard drive at Target to display it.</p>
User Authorization	<p>Displays user authentication for the specified volume.</p> <ul style="list-style-type: none"> • <i>Disabled</i>: No authentication • <i>Enabled</i>: With authentication. User authentication is needed to connect to a volume. <p>* You must register TeraStation as an iSCSI hard drive at Target to display it.</p>
Connect on Start Up	<p>To set the volume to automatically connect when the computer starts up, check the check box and click <i>Connect</i> or <i>Disconnect</i>.</p> <p>To set the volume to not automatically connect when the computer starts up, uncheck the check box and click <i>Connect</i> or <i>Disconnect</i>.</p> <p>* You must register TeraStation as an iSCSI hard drive at Target to display it.</p>
Refresh	Search the TeraStation within the LAN.
Exit	Exit iSCSI Connection Tool.

Menu Navigation Options:

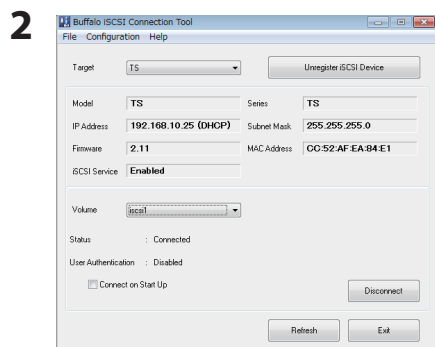
File	Refresh	Search the TeraStation within the LAN.
	Exit	Exit iSCSI Connection Tool.
Configuration	Settings	Opens Settings of the selected TeraStation.
	Change IP Address	You can change the IP address of the selected TeraStation.
	Unregister iSCSI device	If you disconnect the TeraStation without unregistering it or changing its IP address, it will take a long time to search since the registration information stays in your computer. In such a case, unregister the old TeraStation from the Unregister iSCSI Device screen.
	Set mutual CHAP secret	Set the CHAP password on the computer side.
	Use share folder on persistent volumes	If TeraStation is always connected and folders are shared in the network, click this to insert the check mark. If the checkmark is not inserted, the share will be disconnected when the computer is restarted.
	Connect volumes	Displays the screen to connect multiple volume at a time.
	Disconnect volumes	Displays the screen to disconnect multiple volume at a time.
	Disk management	<p>Displays Disk Management screen on Windows.</p> <p>To use the connected TeraStation, you must reserve the volume area and format it on <i>Disk Management</i> screen.</p>
Help	About	Displays iSCSI hard drive version information.

Disconnecting and Removing TeraStation

To remove an iSCSI TeraStation, disconnect any connected volumes first and then unregister the TeraStation.

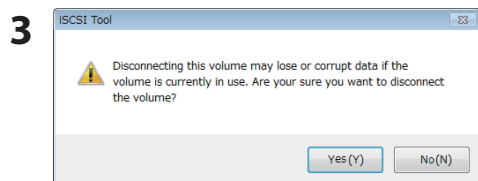
- 1 Click *Start - All Programs - BUFFALO - iSCSI Connection Tool - iSCSI Connection Tool*. The iSCSI Connection Tool will launch.

For Windows 8, click the *iSCSI Connection Tool*.



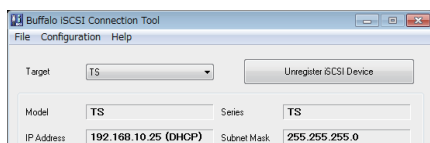
Select the volume to disconnect from *Volume* and click *Disconnect*.

Note: To disconnect multiple volumes at once, choose *Unregister iSCSI Device* from the *Configuration* menu. Click on *Select All*, then *Unregister*.



Click *Yes* to disconnect the volume(s).

4



1 Select the TeraStation to remove from Target.

2 Click *Unregister iSCSI Device*.

Note: If a TeraStation is connected to multiple computers, unregister it from each computer.

5

You can now power down the TeraStation and unplug its cables.

Note: If you disconnect a TeraStation without unregistering it or changing its IP address, it will take a long time to search since the registration information is still in your computer. Use the following procedure to unregister the TeraStation.

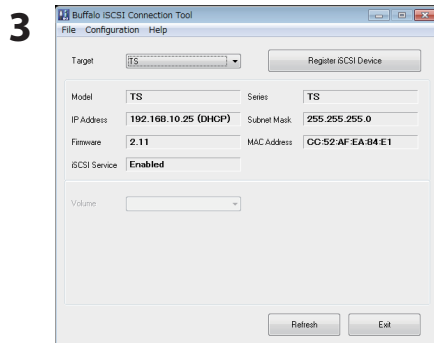
1. Launch iSCSI Connection Tool.
2. Choose *Unregister iSCSI Device* from the *Configuration* menu.
3. Select the disconnected TeraStation and click *Unregister*.

Reconnect a TeraStation

To reconnect a TeraStation that was previously removed, register the device and connect a volume via the procedure below.

- 1 Connect the TeraStation and power it on.
- 2 Click *Start - All Programs - BUFFALO - iSCSI Connection Tool - iSCSI Connection Tool* to open the iSCSI Connection Tool.

For Windows 8, click the *iSCSI Connection Tool*.

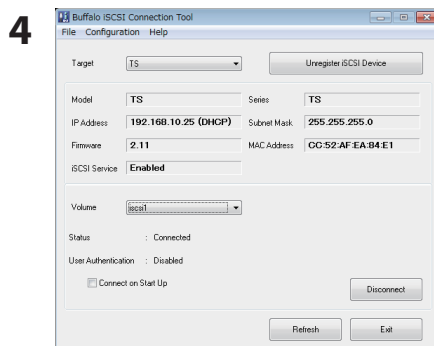


1 Select a TeraStation from Target.

2 Click *Register the iSCSI Device*.

Note:

If access control restrictions were set (from *Basic - Security*), you will be asked to enter the username and password before continuing.



1 Select the volume to connect to.

2 Click *Connect*.

Note:

If access control restrictions were set (from *iSCSI Volumes - Create Volume*), you will be asked to enter the username and password before continuing.

The volume you just connected will be added as a local drive under Computer or My Computer.

Notes:

- If a volume is not formatted, it will not be added as a local drive. To format, select *Disk Management* from *Configuration* menu in iSCSI Connection Tool.
- To connect multiple volumes at once, choose *Connect volumes* from *Configuration* menu.
- To set the volume to automatically connect when the computer starts up. check *Connect on Start Up*.
- With Windows XP or Windows 2000, you cannot connect to volumes larger than 2 TB. If you have a volume that exceeds 2TB, use the Logical Volume Manager (LVM) tool to create volumes smaller than 2TB before connecting.

Mutual Authentication

The iSCSI TeraStation supports mutual authentication for security. Mutual authentication ensures that a computer will recognize the TeraStation only when the mutual password set on each volume and the mutual authentication password are a match. To configure Access Control via mutual authentication, refer to page 26.

Mutual Authentication password set to the TeraStation (Entire system):

In Settings, navigate to *Basic - Security - Access Control (Whole System)*. Click *Modify Settings*, and select *Mutual Authentication* for Access Control. If the password set on the computer matches the volume name in Volume, iSCSI Connection Tool will be functional.

Note:

- If the volume name is not displayed in the Volume field, then the mutual authentication password on the computer does not match. If this occurs, select *Configuration* in the iSCSI Connection Tool. Select *Set mutual CHAP Secret* to enter the correct password, then select *OK*.

Mutual Authentication password set to each volume:

In Settings, navigate to *iSCSI Volumes - iSCSI Volumes*. Click *Mutual Authentication* for Access Control and enter a new password in Password (Mutual Authentication) field.

The password set here is used to connect to the volume. The mutual authentication password must also be set on the computer in order to connect to the volume.

Mutual Authentication password set on the Computer Side

If you configure mutual authentication on a TeraStation or individual volumes, enter the same password as you set on the TeraStation for access restrictions for each volume on the mutual authentication password screen. The password you entered is maintained as a mutual authentication password on the computer. If there are multiple volumes, the computer will only connect to the volumes which have the correct password. You cannot connect to multiple volumes with different mutual authentication passwords. To connect to a volume with a different password, you must change the password in iSCSI Connection Tool menu.

Note:

- If the mutual authentication password of the TeraStation and that of the volume are different, the volume name will not be displayed on the main screen in iSCSI Connection Tool. Select *Settings, Set mutual CHAP Secret, OK* to enter the matching password.

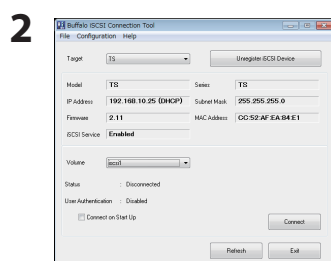
Chapter 3

Settings

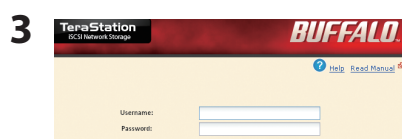
Use the Settings menu to configure your TeraStation.

- 1 Click **Start - All Programs - BUFFALO - iSCSI Connection Tool - iSCSI Connection Tool**. iSCSI Connection Tool will launch.

For Windows 8, click the *iSCSI Connection Tool*.



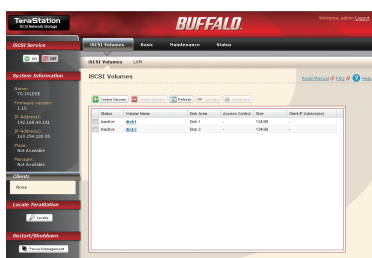
If 2 or more TeraStations are connected, select the one to configure. Write down the TeraStation's IP Address. Click *Settings* from the *Configuration* menu.



- 1 Enter the username and password.
Initially, use the default username and password.
Username: **admin**
Password: **password**

- 2 Click *Login*.

- 4 Settings opens.



Notes:

- Settings supports Firefox 1.5 or later, Internet Explorer 6 SP 2 or later, and Safari 3 or later.
- If proxy is enabled on your browser, Settings will not be displayed correctly. Disable proxy if it is enabled.
- Security settings may prevent Settings from displaying normally. In Internet Explorer, select *Tools - Internet Options - Security* and set security to *Local intranet*.
- To open Settings from a browser window, type the TeraStation's IP address into the URL field of the browser, then press the Enter key. Enter the username and password as above.

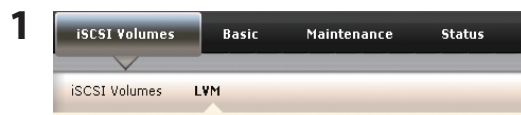
Chapter 4

Using Logical Volume Manager (LVM)

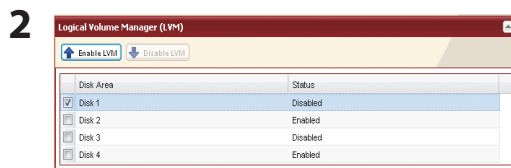
Enable/Disable Logical Volume Manager (LVM)

Logical Volume Manager (LVM) is disabled by default. Enabling LVM will allow you to divide volumes and extend capacity, but will degrade access speeds.

Note: Changing the operation mode of a disk or array (such as enabling LVM) will delete all volumes and data from the disk or array. Back up any important data before making any configuration changes!



In Settings, navigate to *iSCSI Volumes - LVM*.



Select the RAID array or the drive from *Disk Area*, and click *Enable LVM* or *Disable LVM*.

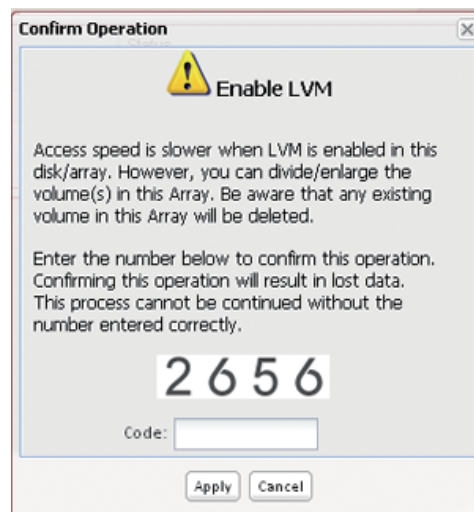
- 3 The Confirm Operation screen will appear.
Enter the displayed number and click *Apply* within 60 seconds.

LVM is now enabled.

Confirm Operation screen

The Confirm Operation screen will also display whenever you perform any of the following tasks. To complete the task, enter the displayed number and click *Apply* within 60 seconds.

- Creating or deleting RAID arrays
- Initialization
- Formatting drives
- Set as a normal drive
- Delete iSCSI volume
- Format Array or Disk
- Unplug hard drives
- Rebuild RAID Array
- Configure hot spare
- Enable or disable LVM



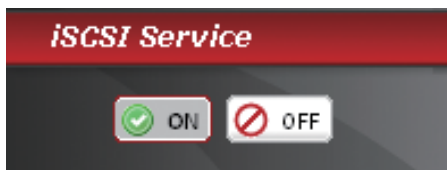
Create Volume

By default, the TeraStation is configured with a single volume using all available space on the TeraStation. If you delete the factory-set volume, you will then have the capacity to create up to 32 new volumes. Different volumes can be connected to different computers, but each volume can only be connected to a single computer.

Notes:

- Deleting the default volume will delete all data from the TeraStation. Back up any important data before making any configuration changes!
- LVM must be enabled in order to delete or create volumes. Refer to page 14.

1

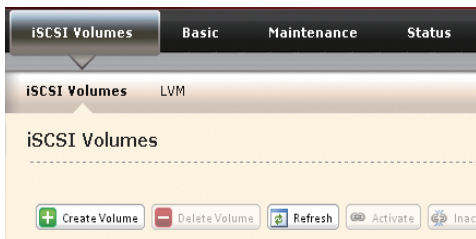


Turn off iSCSI Service on the left side of Settings.

Note:

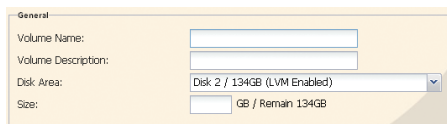
To stop iSCSI service for the target volume only, navigate to *iSCSI Volumes - iSCSI Volumes*, select the target volume, and click *Inactivate*.

2



Navigate to *iSCSI Volumes - iSCSI Volumes*. Highlight the default volume and click *Delete Volume*. Then, click *Create Volume*.

3



Enter Volume Name, Volume Description, Disk Area, and Size.

4

Click *Save*.

5

Turn iSCSI Service back on.

Note:

To start iSCSI service for the target volume only, navigate to *iSCSI Volumes - iSCSI Volumes*, select the target volume, and click *Activate*.

You have created a new volume.

Note:

To use the new volume, you need to connect it (page 11), and format it with Disk Management on Windows. You may open Disk Management from the iSCSI Connection Tool by clicking *Disk management* from the *Configuration* menu.

Extending Volumes

Volume space can be extended after you create the volume.

Notes:

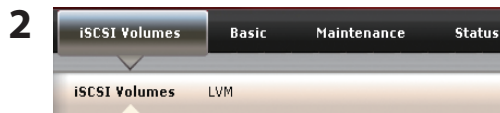
- Extending the volume may delete all data on the volume with some file systems. Before extending the volume, back up any important data on the volume.
- LVM must be enabled in order to extend volumes. Refer to page 14.



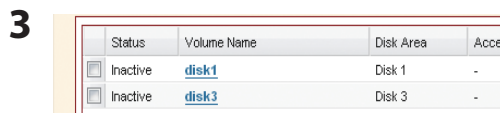
Turn off iSCSI Service on the left side of Settings.

Note:

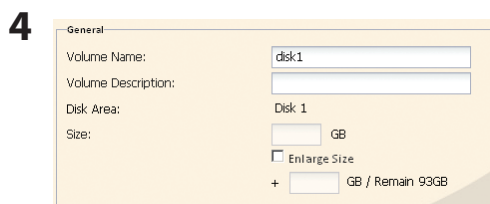
To stop iSCSI service for the target volume only, navigate to *iSCSI Volumes - iSCSI Volumes*, select the target volume, and click *Inactivate*.



Navigate to *iSCSI Volumes - iSCSI Volumes*.



Click the volume you want to extend.



1 Check the *Enlarge Size* box.

2 Enter the amount of space to increment the volume in GB.

5 Click *Save* at the bottom of the screen.

6 Turn iSCSI Service back on.

Note:

To start iSCSI service for the target volume only, navigate to *iSCSI Volumes - iSCSI Volumes*, select the target volume, and click *Activate*.

You have now extended the size of a volume.

Note:

Your OS may not detect extended volumes. In this case, reinitialize and reformat the extended volume before use.

Chapter 5

Changing RAID Modes

By default your TeraStation unit is configured with all four hard drives in a RAID 5 array, with other RAID array modes available for configuration.

Notes:

- All data on your drive will be deleted if you change the RAID mode. Back up any important data before changing RAID modes.
- In this document, the term “Recovery” means reverting the TeraStation back to the state prior to the RAID mode change. It does not refer to reading data from failed hard drives.

• RAID 5 mode (4 hard drives) (factory default)

Arranges 4 hard drives in one array. Parity is stored (to reconstruct data in the case of an error), so total usable space is the sum of the capacity of 3 drives, and access speeds will be slower than other available RAID modes. If one of the drives fails, you can recover data on the array by replacing the damaged drive. However, data cannot be recovered if 2 or more drives become damaged.

• RAID 5 mode (3 hard drives)

Arranges 3 hard drives in one array. Parity is stored (to reconstruct data in the case of an error), so total usable space is the sum of the capacity of 2 drives, and access speeds will be slower than other available RAID modes. The fourth drive may be configured as a hot spare that will automatically replace a failed drive. If one of the drives fails, you can recover data on the array by replacing the damaged drive. However, data cannot be recovered if 2 or more drives become damaged.

• RAID 10 mode

Arranges 4 hard drives in one array, with 2 stripes of mirrored drives. Total usable space is the sum of the capacity of 2 hard drives. Data will be written speeded, increasing access speed. Since data is written into 2 hard drives at the same time, even if one of the drives fails, data can still be recovered by replacing the damaged drive (data cannot be recovered if both drives become damaged).

• RAID 1 mode

Arranges 2 hard drives in one array. You can create up to 2 RAID 1 arrays, with total usable space on each array being the capacity of one of the drives. If either drive fails, data can be recovered by replacing the damaged drive (data cannot be recovered if both drives become damaged). The other two drives not used in the RAID 1 array can be configured either as a hot spare (which replaces any failed drive automatically), a second RAID 1 array, or as individual drives. Alternatively, one may configured as an individual drive and the other a hot spare.

Note:

After replacing a failed drive in any of the above arrays, file transfer speeds will be slower for several hours while the RAID array is being rebuilt. During this period, the front LED display will show “RAID ARRAYx Resyncing”.

- **RAID 0 mode**

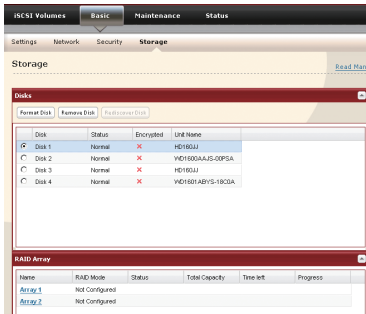
Combines 4 drives into one fast array. The full capacity of all drives combined is available for use. RAID 0 is fast and efficient, but includes no parity or redundancy. If any drive is damaged, all data on the array is lost.

- **Normal mode**

In Normal mode, drives are not combined into arrays. Each drive is individually available. The full capacity of each drive is usable. If a drive is damaged, all data on that drive is lost.

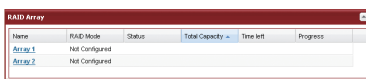
Using Normal mode

1



In Settings, navigate to *Basic - Storage - RAID Array*.

2



Choose the array to change.

3

Click *Delete RAID Array*. This will take several seconds, and the front panel display will show “RAID ARRAY x Creating”.

4

When “Are you sure you want to operate RAID Operation?” is displayed, click *Apply*.

5

The Confirm Operation screen will appear. Type in the confirmation number and click *Apply* within 60 seconds.

6

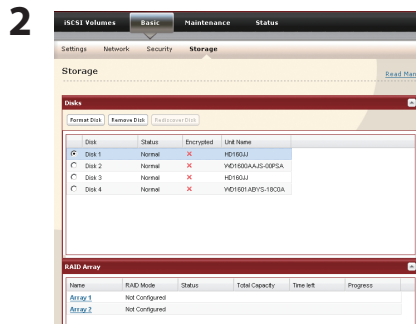
Follow the instructions displayed on the screen.

You have configured Normal mode. Refer to page 15 to create volumes on the four drives. Use Disk Management on Windows to format the volumes on the drives, then connect to the formatted volumes with iSCSI Connection Tool and use them as local drives on your computer.

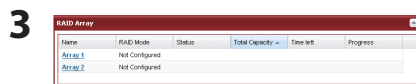
Using RAID 5 mode (4 hard drives)

Note: This is the default configuration.

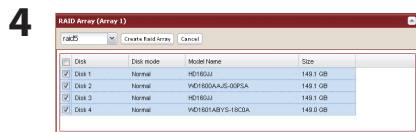
1 Delete any preexisting array as described in “Using Normal mode” on page 19.



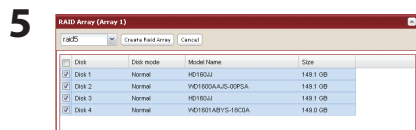
In Settings, navigate to *Basic - Storage - RAID Array*.



Choose the array you want to configure.



Select all 4 hard disks.



1 Select *RAID 5*.
2 Click *Create Raid Array*.

Note:

Building the RAID array will take about 10 hours per TB of drive space. During this time, the LCD will display “RAID ARRAY x Resyncing” and file transfers will be slower than usual. Do not turn off the TeraStation until the array is built, or the process will start over at reboot.

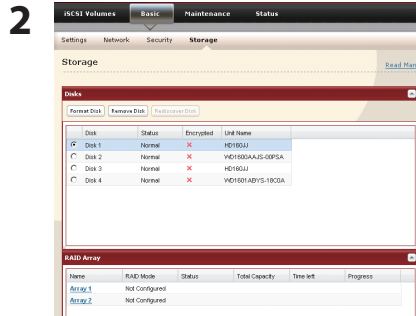
6 The Confirm Operation screen will appear. Enter the displayed number and click *Apply* within 60 seconds to continue.

7 Follow the instructions displayed on the screen.

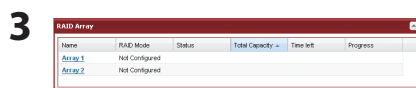
You have configured a RAID 5 array with 4 drives. Refer to page 15 to create a volume on the array. Use “Disk Management” on Windows to format the volume, then connect to the formatted volume with iSCSI Connection Tool and use it as a local drive on your computer.

Using RAID 5 mode (3 hard drives)

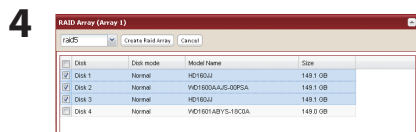
1 Delete any preexisting array as described in “Using Normal mode” on page 19.



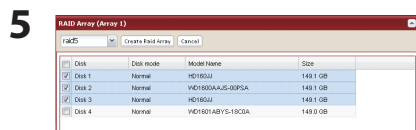
In Settings, navigate to *Basic - Storage - RAID Array*.



Choose the array you want to configure.



Select 3 hard disks.



1 Select *RAID 5*.

2 Click *Create Raid Array*.

Note:

Building the RAID array will take about 10 hours per TB of drive space. During this time, the LCD will display “RAID ARRAY x Resyncing” and file transfers will be slower than usual. Do not turn off the TeraStation until the array is built, or the process will start over at reboot.

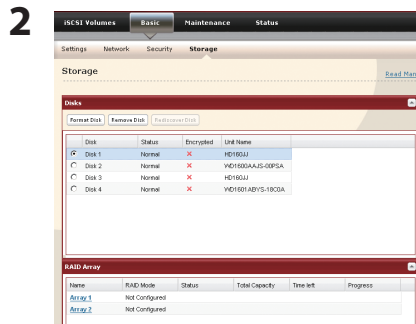
6 The Confirm Operation screen will appear. Enter the displayed number and click *Apply* within 60 seconds to continue.

7 Follow the instructions displayed on the screen.

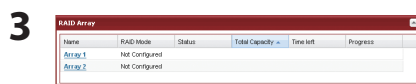
You have configured a RAID 5 array with 3 drives. Refer to page 15 to create a volume on the array. Use Disk Management on Windows to format the volume, then connect to the formatted volume with iSCSI Connection Tool and use it as a local drive on your computer. For best results, configure the remaining hard drive as a hot spare (page 25).

Using RAID 10 mode

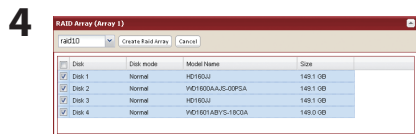
1 Delete any preexisting array as described in “Using Normal mode” on page 19.



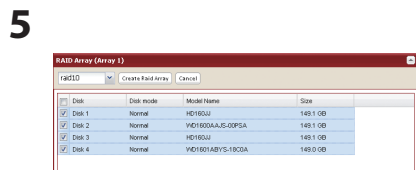
In Settings, navigate to *Basic - Storage - RAID Array*.



Choose the array you want to configure.



Select all four hard drives.



1 Select *RAID 10*.

2 Click *Create Raid Array*.

Note:

Building the RAID array will take about 10 hours per TB of drive space. During this time, the LCD will display “RAID ARRAY x Resyncing” and file transfers will be slower than usual. Do not turn off the TeraStation until the array is built, or the process will start over at reboot.

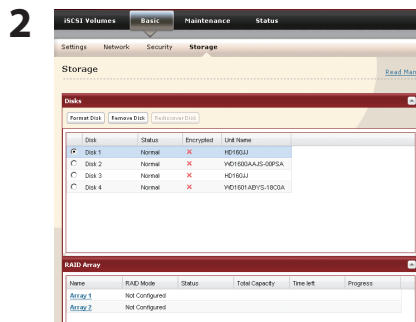
6 The Confirm Operation screen will appear. Enter the displayed number and click *Apply* within 60 seconds to continue.

7 Follow the instructions displayed on the screen.

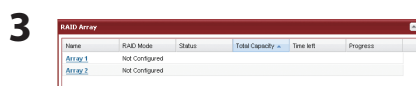
You have configured a RAID 10 array. Refer to page 15 to create a volume on the array. Use Disk Management on Windows to format the volume, then connect to the formatted volume with iSCSI Connection Tool and use it as a local drive on your computer.

Using RAID 1 mode

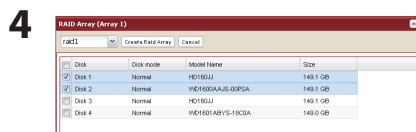
1 Delete any preexisting array as described in “Using Normal mode” on page 19.



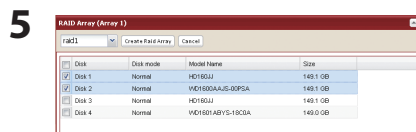
In Settings, navigate to *Basic - Storage - RAID Array*.



Choose the array you want to configure.



Select disk 1 and disk 2, or disk 3 and disk 4.



1 Select *RAID 1*.
2 Click *Create Raid Array*.

Note:

Building the RAID array will take about 10 hours per TB of drive space. During this time, the LCD will display “RAID ARRAY x Resyncing” and file transfers will be slower than usual. Do not turn off the TeraStation until the array is built, or the process will start over at reboot.

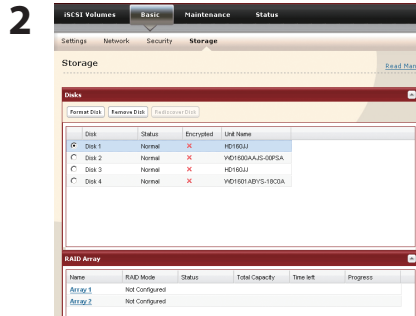
6 The Confirm Operation screen will appear. Enter the displayed number and click *Apply* within 60 seconds to continue.

7 Follow the instructions displayed on the screen.

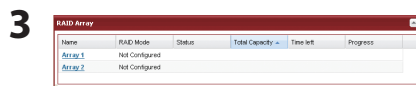
You have configured a RAID 1 array with 2 drives. Refer to page 15 to create a volume on the array. Use “Disk Management” on Windows to format the volume, then connect to the formatted volume with iSCSI Connection Tool and use it as a local drive on your computer. For best results, configure one or both of the remaining drives as a hot spare (page 25).

Using RAID 0 mode

1 Delete any preexisting array as described in “Using Normal mode” on page 19.



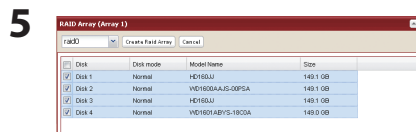
In Settings, navigate to *Basic - Storage - RAID Array*.



Choose the array you want to configure.



Select all 4 hard drives.



- 1 Select *RAID 0*.
- 2 Click *Create Raid Array*.

6 The Confirm Operation screen will appear. Enter the displayed number and click *Apply* within 60 seconds to continue.

7 Follow the instructions displayed on the screen.

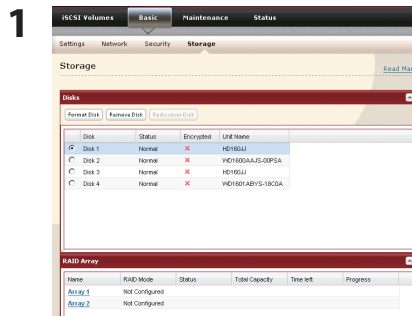
You have configured a RAID 0 array. Refer to page 15 to create a volume on the array. Use Disk Management on Windows to format the volume, then connect to the formatted volume with iSCSI Connection Tool and use it as a local drive on your computer.

Configuring a Hot Spare

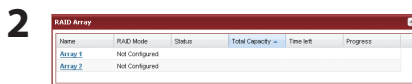
A hot spare will automatically replace a failed drive in a RAID array. You must have an extra drive to configure as a hot spare, so it is only usable with a RAID 5 array of 3 drives or a RAID 1 array. Configure a hot spare as follows.

Note:

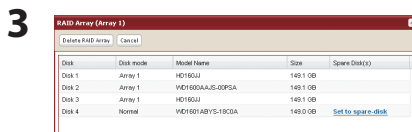
When you change a drive from normal mode to a hot spare, or from a hot spare back to normal mode, all data on the drive is lost. Back up any important data on the drive before changing settings.



In Settings, navigate to *Basic - Storage - RAID Array*



Click an array which is set either RAID 5 or RAID 1.



Click *Set to spare-disk*.

Note:

You can change a hot spare drive to a normal drive by clicking *Set to normal disk*.

4 The Confirm Operation screen will appear. Enter the displayed number and click *Apply* within 60 seconds to continue.

5 Follow the instructions displayed on the screen.

You have configured a hot spare.

Drive Failures

If a drive in the TeraStation fails, open the front cover and check the Status LED lights. If a drive's Status LED is lit or flashing red, it is malfunctioning and needs to be replaced. For replacement, use Buffalo OP-HD series drives of the same size.

For more information on drive removal, installation, and rebuilding RAID arrays, refer to the "Hard Drive Replacement Procedure" document available from the link provided in the TeraNavigator CD. You can also download the document from www.buffalotech.com.

Chapter 6

Access Restrictions

You may configure access restrictions for the TeraStation, or for individual volumes on it. When access restrictions are set, a username and password are required to connect to the TeraStation with iSCSI Connection Tool.

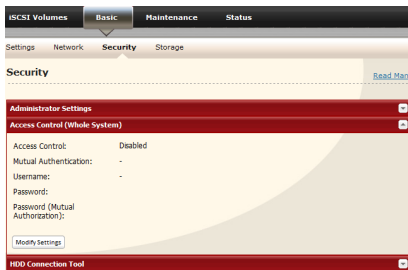
Configuring Access Restrictions for the TeraStation

1



Turn off iSCSI Service on the left side of Settings.

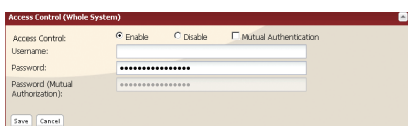
2



1 Navigate to *Basic - Security - Access Control (Whole System)*.

2 Click *Modify Settings*.

3



1 Click *Enable*.

2 Enter Username and Password.

3 Click *Save*.

4 Turn iSCSI Service back on.

Note:

Access Restrictions by Mutual Authentication

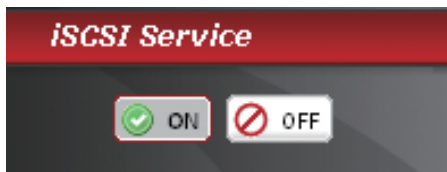
•Use the following settings to set access restrictions by mutual authentication in addition to the normal access restrictions:

In the screen shown in step 3, check *Mutual Authentication* for *Access Control* and set any password you want for *Password (Mutual Authorization)*. Select *Mutual Authorization* for *User Authorization*. The screen to enter the mutual authentication password will open. Enter the password you set.

You've configured access restrictions for the TeraStation.

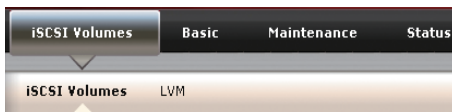
Configuring Access Restrictions for Individual Volumes

1



Turn off iSCSI Service on the left side of Settings.

2



Navigate to *iSCSI Volumes* - *iSCSI Volumes*.

3

Status	Volume Name	Disk Area	Access
Inactive	disk1	Disk 1	-
Inactive	disk3	Disk 3	-

Select the volume that you want to set access restrictions for.

4

To restrict access by user names and passwords, enable *Access Control*, and enter Username and Password.

To restrict access by IP Address, enable *IP Address Restriction*, and enter the IP addresses that are to be allowed access. Separate each IP address by a comma.

Example: 192.168.11.1,192.168.11.2

5

Click *Save*.

6

Turn back on iSCSI Service again.

Note:

Access Restrictions by Mutual Authentication using Username and Password

- Use the following settings to set access restrictions by mutual authentication in addition to the normal access restrictions:

In the screen described in step 4, check *Mutual Authentication* and set any password you want for Password (Mutual Authentication). Select *Mutual Authorization* for User Authorization. The screen to enter the mutual authentication password will open. Enter the password you set.

- Changes to access restriction settings will not take effect until the iSCSI service has been turned off and then on again.

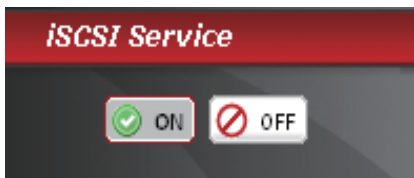
You've configured access restrictions for a volume.

Chapter 7

Managing your TeraStation

Name, Date and Time

1



Turn off iSCSI Service on the left side of Settings.

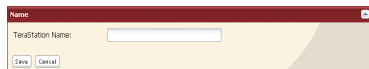
2



1 Navigate to *Basic - Settings - Name*.

2 Click *Modify Settings*.

3



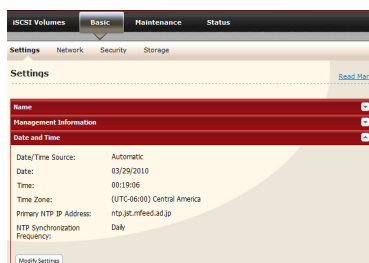
1 Enter TeraStation Name. This will identify it on the network.

2 Click *Save*.

Note:

TeraStation names can contain up to 15 bytes (UTF-8). Do not use multi-byte characters. Alphanumeric characters, and -(hyphen) may be used. Do not use a symbol as the first character.

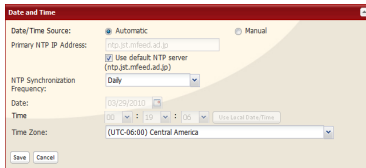
4



1 Navigate to *Basic - Settings - Date and Time*.

2 Click *Modify Settings*.

5



1 To manually configure the date and time, click *Manual* for Date/Time Source and adjust Date, Time, and Time Zone.

Note:

Click *Use Local Date/Time* to use the time and date from your computer's settings.

2 Click *Save*.

6 Turn iSCSI Service back on.

By default, the TeraStation adjusts its clock automatically by using an NTP server.

NTP

- NTP may not be usable in some networks.
- The default NTP Server (ntp.jst.mfeed.ad.jp) belongs to Internet Multi Feed Inc. For more information, please visit www.jst.mfeed.ad.jp.
- Use NTP at your own risk. Buffalo Technology is not responsible for any loss or damage caused by using of this service, stopping the service, or missing service.

Notes:

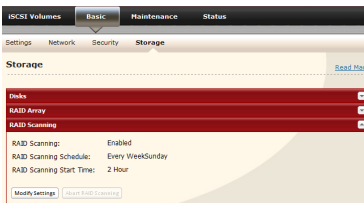
- You may need to configure DNS to access an NTP server.
- The TeraStation's internal clock may run at a slightly different speed from other clocks on you network, and over a long period of time your network devices may show different times. If clocks on your network vary by more than 5 minutes, unexpected behavior may occur. For best results, keep all clocks on the network set to the same time by adjusting them regularly, or use an NTP server to correct them all automatically.

Name and time settings for the TeraStation are complete.

RAID Scanning

Regular RAID scans are recommended for your RAID array. A RAID scan will scour your RAID array for errors, and some detected errors may be automatically corrected. Follow the procedure below to configure RAID scanning schedule.

1



1 In Settings, navigate to *Basic - Storage - RAID Scanning*.

2 Click *Modify Settings*.

2



1 Click *Enable*.

2 Select your desired schedule for RAID Scanning Schedule.

3 Click *Save*.

Notes:

- If *Begin Immediate RAID Scan* is selected, then a RAID scan will begin immediately.
- To stop a RAID scan, click *Abort RAID Scanning*.

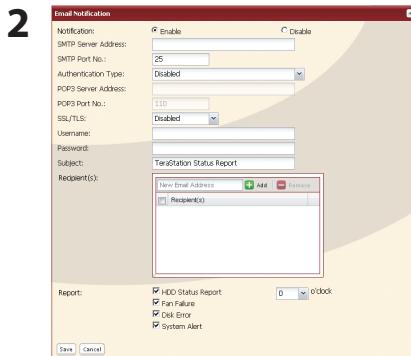
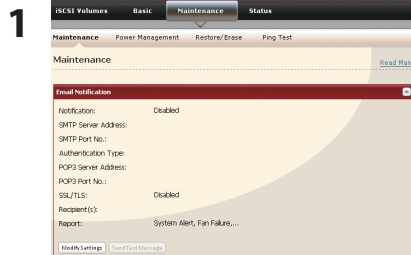
You have configured RAID scanning.

Email Notification

The TeraStation can be configured to automatically send an email notification whenever its settings are changed or if an error occurs.

Common notifications include:

- Hard drive status update (at scheduled intervals)
- Changes to current RAID configuration
- RAID error alert
- Fan error alert
- Hard drive read error alert
- Hard drive replacement alert



1 In Settings, navigate to *Maintenance - Maintenance- Email Notification*.

2 Click *Modify Settings*.

1 Enable *Notification*.

2 Enter SMTP Server Address and SMTP Port No.

Note:

If using POP before SMTP, enter POP3 Server Address and POP3 Port No.

3 Select Authentication Type from *Disabled*, *POP before SMTP*, *LOGIN (SMTP-AUTH)*, or *CRAM-MD5(SMTP-AUTH/CRAM-MD5)*.

4 Enter Username.

5 Enter Password.

Note:

Don't use the character ' (single quotation mark) in a password.

6 Enable *SSL* or *TLS* for a secure connection.

7 Enter Subject for notification.

Note: Use alphanumeric characters only. Do not use multi-byte characters.

8 Enter an email address. Up to 5 email addresses may be entered.

9 Select the conditions to send.

- *HDD Status Report* Current status of the hard drives at the specified time.
- *Fan Failure* When a fan failure occurs.
- *Disk Error* When a hard drive error occurs.
- *System Alert* When the TeraStation is rebooted or shut down. Also when current RAID configuration is changed.

10 If you have selected *HDD Status Report* for sending condition, select time to send.

11 Click *Save*.

You have configured email alerts.

Examples:

These emails are for example only. Your notification emails may be different.

• **This email includes** *HDD Status Report*:

TeraStation Status Report: Periodical Report: Information
TeraStation Information
TeraStation Name: TS-xxxxx
Time Stamp: 2009/03/23 00:00:01
IP Address: 172.16.37.62
Configuration Screen: <http://172.16.37.62/>
Continuous operating time: 13:51:57

• **This email includes** *Disk Error*:

TeraStation Status Report: DISK Error Notification: Failure: Fail to mount a disk
DISK Error Notification
The error occurred on HDD.
The erroneous disk drive: Disk 1
Disk could not be mounted.

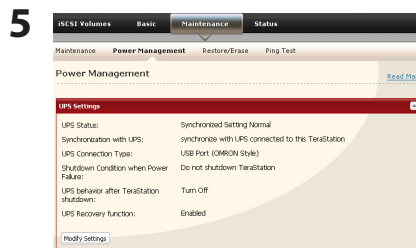
• **This email includes** *Fan Failure*:

TeraStation Status Report: FAN Error Notification: Failure: FAN stopped.
FAN Error Notification
The FAN has stopped.
The internal temperature is now over the threshold. Shut down the system.
System temperature: 52 [°C]

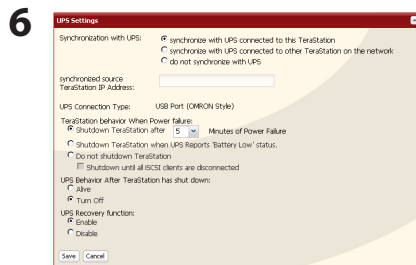
UPS Settings

For best results, plug your TeraStation in to a UPS (Uninterruptible Power Supply). This will protect it from many kinds of power outages. When connected to a UPS, The TeraStation can be automatically shut down to protect data. Configure the following settings to use the TeraStation with a UPS.

- 1 Connect the UPS to a wall socket.
- 2 Connect the AC cable of the TeraStation to the UPS.
- 3 Connect the UPS and the TeraStation with either a USB cable or a serial cable.
- 4 Turn on the UPS, then turn on the TeraStation.



- 1 In Settings, navigate to *Maintenance - Power Management - UPS Settings*.
- 2 Click *Modify Settings*.



- 1 Configure the desired settings.
If your TeraStation is connected directly to the UPS, select *synchronize with UPS connected to this TeraStation*. To have the UPS shut down multiple TeraStations on the same network, select *synchronize with UPS connected to other TeraStation on the network* and enter the IP address of the TeraStation that is connected directly to the UPS in the field below.
- 2 Click *Save*.

Your UPS is now configured.

Notes:

- Refer to Buffalo Technology's website (www.buffalotech.com) for compatible UPS units.
- If the TeraStation unit has automatically shut down due to a power outage, do not turn the unit on until power is restored. Doing so will force the unit to run on the battery of the UPS, and thus will not shut down automatically a second time, even if the battery is low.
- If UPS *Recovery function* is enabled, the UPS will automatically restart the TeraStation when normal power is restored.

Beep Alerts

The TeraStation can be configured to emit a beep if an error occurs. Follow the below procedure to select the events that can trigger the beep.

- 1 In Settings, navigate to *Maintenance - Maintenance - Alert Sound Settings*
- 2 Click *Modify Settings*.



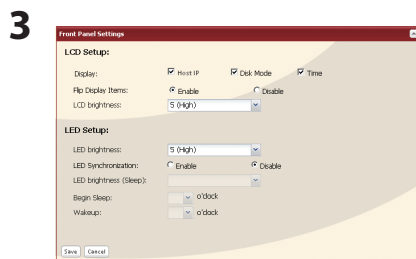
- 1 Select the conditions to beep the alert from *Overheating, Disk Error, Fan Error, or UPS power Error*.
- 2 Click *Save*.

You have now configured alerts.

Display Settings

You may configure the LEDs and LCD screen on the front of the TeraStation here.

- 1 In Settings, navigate to *Maintenance - Maintenance - Front Panel Settings*.
- 2 Click *Modify Settings*.



- 1 Configure the desired settings for LCD Setup and LED Setup.
- 2 Click *Save*.

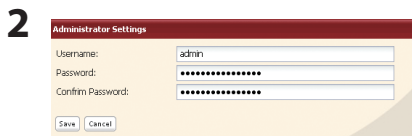
You have completed the settings for the display panel.

Changing the Admin Username and Password

The admin account is used to access Settings and change the TeraStation's settings. By default, the admin username is "admin" and the password is "password". You may change them as shown below.



- 1 In Settings, navigate to *Basic - Security - Administrator Settings*.
- 2 Click *Modify Settings*.



- 1 Enter new Username and Password.
- 2 Click *Save*.

Notes:

- Usernames can contain up to 20 bytes (UTF-8). Do not use multi-byte characters. Alphanumeric characters and hyphens (-) may be used. Do not use a symbol as the first character.
- Passwords can contain up to 20 bytes (UTF-8). Do not use multi-byte characters. Alphanumeric characters and the following special characters may be used: - _ @ ! # \$ % & ' () * + , . / ; < > = ? ^ { } | ~ Do not use a symbol as the first character.

You've changed the admin username and password. To access Settings in the future, use the new username and password.

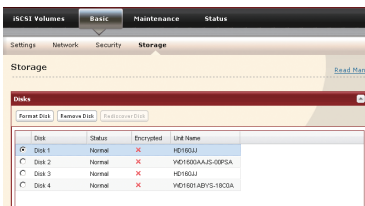
Formatting Drives

You may format any or all drives on the TeraStation via the procedure below. Formatting a drive will delete all data and settings from that drive, so be sure to back up any important data before formatting a drive.

Formatting will take several minutes. During the formatting process, other volumes or drives on the TeraStation will not be accessible. Do not turn off the TeraStation while formatting.

After a successful drive format, you must create a partition and format it from within the operating system. A link to “Disk Management” on Windows is available from Buffalo’s iSCSI Connection Tool.

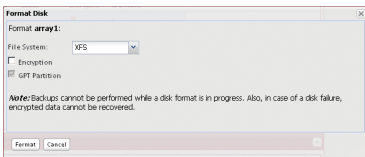
1



1 In Settings, navigate to *Basic - Storage - Disks*.

2 Select the disk you want to format, and click *Format Disk*.

2



1 Select a File System.

Note:

If you select *Encryption*, the drive will be encrypted with 128-bit AES. The drive can then be accessed via the TeraStation only (i.e. the drive cannot be accessed if attached to another device). If encryption is enabled, data recovery services will not be able to recover data from a damaged disk. To unencrypt the drive, uncheck *Encryption* and format it again.

2 Click *Format*.

3 The Confirm Operation screen will appear. Type in the confirmation number and click *Apply* within 60 seconds.

4 Follow any instructions on the screen.

While formatting, the word “Formatting” is displayed on the front LCD.

Note:

The time needed to format a drive varies depending on the size of the drive. It will take several minutes at least.

The drive is successfully formatted.

Encrypting Drives

If Encryption is selected during formatting, the drive will be encrypted with 128-bit AES. The data on the drive will be accessible only when the drive is attached to the TeraStation, and not other devices. To unencrypt the hard drive, uncheck *Encryption* and format the drive again. Refer to the previous page for more information.

Note:

Encrypting a drive degrades its overall performance somewhat.

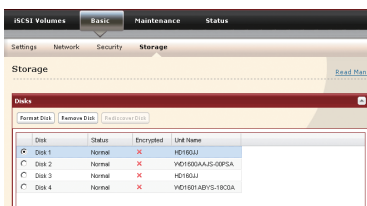
Dismounting a Drive

Before removing a drive from the TeraStation, dismount the drive. Follow the instructions below to dismount the drive.

Note:

Repeatedly dismounting and/or removing drives is not recommended. Only dismount and remove drives if you have a good reason for doing so.

1



1 In Settings, navigate to *Basic - Storage - Disks*.

2 Select the drive you want to remove, and click *Remove Disk*.

2

The Confirm Operation screen will appear. Type in the confirmation number and click *Apply* within 60 seconds.

3

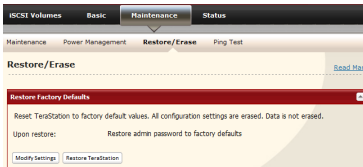
Follow the instructions displayed on the screen.

It's now safe to physically remove the hard drive.

Erasing All Data

Data on the hard drive is not completely erased by just deleting it, or even formatting the drive. It could theoretically be recovered. To completely wipe all data from the drive and follow the steps below.

1



In Settings, navigate to *Maintenance - Restore/Erase - Erase*.

2



Click *Erase*.

3

The Confirm Operation screen will appear. Type in the confirmation number and click *Apply* within 60 seconds.

4

Follow the instructions on the screen.

After the process is complete, all partitions and data on the drive will be erased. The TeraStation will automatically shut down when complete. After a reboot, the TeraStation's settings will be as follows:

Hard drives: normal mode
All settings: factory defaults
Logs: Deleted

Note:

If you execute the erasure process on the TeraStation while a drive is missing, the error "HDx Error E22 HDx Can't Mount" (x indicates the hard drive number you have removed) will appear on the front LCD display when the process is complete. However, you can still use the TeraStation, since its functionality is not affected.

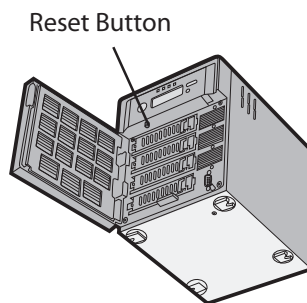
Initializing Settings

Reset Button

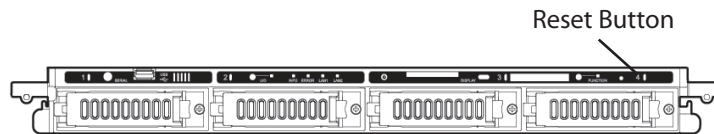
To reset the TeraStation's settings to factory defaults, use the included key to open the front cover to access the reset button. While the TeraStation is running and the power LED is lit, hold down the reset button until it beeps (about 5 seconds). This will reset the TeraStation's settings to the factory default.

Hold down the reset button until it beeps (about 5 seconds). This will reset the TeraStation's settings to their factory defaults.

TS-IXL



TS-RIXL



To press the reset button on the TS-RIXL series, use the tip of an unfolded paper clip.

- The reset button initializes the following settings: IP address, Ethernet frame size, admin username and password, port trunking (initial setting: disabled), iSCSI HDD Connection Tool detection (initial setting: enabled). Other settings can be initialized from Settings (page 40).
- To keep the current username and password when initializing the TeraStation, navigate to *Maintenance - Restore/Erase-Restore Factory Defaults - Modify Settings* in Settings and select *Keep current admin password*. Click *Save*.

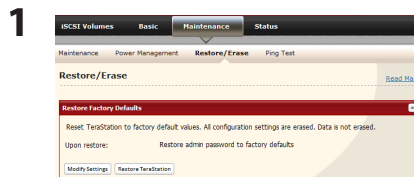
If you disable resetting the admin password from the reset button, you can no longer configure the TeraStation if you forget the password. Write down your password and keep it in a safe place.

Initialization from Settings

You can also initialize the TeraStation from Settings.

The following settings are reset to their factory defaults:

TeraStation Name, NTP Settings, RAID Scanning, Upon restore, Email Notification Settings, UPS Settings, Administrator Settings, Network Settings (IP Address, Subnet Mask, etc.), Alerts Sound Settings, Front Panel Settings, RAID Array Failure Settings, Management Information, Language Settings, Syslog.



1 In Settings, navigate to *Maintenance - Restore/Erase - Restore Factory Default*.

2 Click *Restore TeraStation*.

Note:

To keep the current admin username and password, navigate to *Maintenance - Restore/Erase*. Click *Modify Settings*. Select *Keep current admin password*, then *Save*.

2 The Confirm Operation screen will appear. Type in the confirmation number and click *Apply* within 60 seconds.

3 Follow the instructions displayed on the screen.

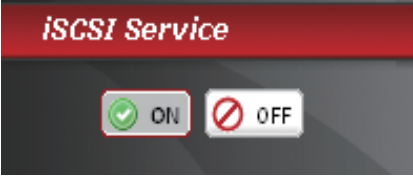
Changing the IP address

If desired, you may manually set the TeraStation's IP address. Use the iSCSI Connection Tool (included on your CD) to manually set the TeraStation's IP address.

Note:

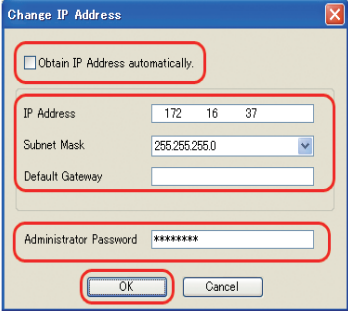
You can only change the TeraStation's IP address settings from a computer that is connected to the same subnet as the TeraStation.

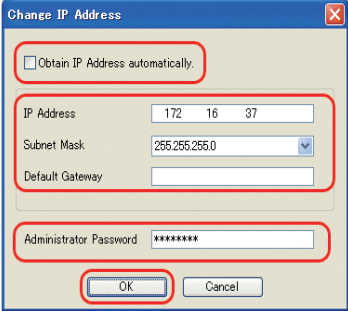
- 1  Turn off iSCSI Service on the left side of Settings.



- 2 Click *Start - All Programs - BUFFALO - iSCSI Connection Tool - iSCSI Connection Tool*.
For Windows 8, click the *iSCSI Connection Tool*.

- 3 Select your TeraStation from the Target dropdown menu, then click *Configuration*, then *Change IP Address*.

- 4 
 - 1 If you have a DHCP server on your network, check *Obtain IP address automatically*.
 - 2 You may enter IP Address, Subnet Mask, and Default Gateway.
 - 3 Enter the admin password in Administrator Password field. The admin password is required to change IP address settings.
 - 4 Click *OK*.



- 5 Turn iSCSI Service back on.

You have changed your TeraStation's IP Address settings.

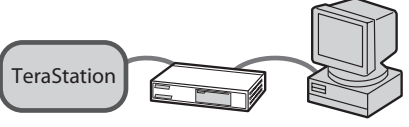



Jumbo Frame

If all of your network devices support Jumbo Frame, enabling them can make your network faster. To configure Jumbo Frame on the TeraStation, navigate to *Basic - Network - Ethernet Frame Size* in Settings. Click *Modify Settings*, and change the Ethernet frame size to one of Jumbo Frame settings: 4120, 7422, or 9694 bytes.

To configure Jumbo Frame settings, you will need to turn off iSCSI Service, then turn it back on once changes have been made.

Caution:

If you enable Jumbo Frame but some of your network devices don't support it, you may not be able to transfer data. If you run into compatibility issues, disable Jumbo Frame and set all of your network devices to use standard transmission (1518 bytes).

Connection	Transmission	
 <p>TeraStation Jumbo Frame (4120/7422/9694) Jumbo Frame Supported Jumbo Frame Supported</p>	○	Transmit Jumbo Frame (4120/7422/9694)
 <p>TeraStation Jumbo Frame (4120/7422/9694) Jumbo Frame Supported Jumbo Frame <u>Not supported</u></p>	△	Transmit normally (1518)
 <p>TeraStation Jumbo Frame (4120/7422/9694) Jumbo Frame <u>Not supported</u> Jumbo Frame <u>Not supported</u></p>	△	Transmit normally (1518)
 <p>TeraStation Jumbo Frame (4120/7422/9694) Jumbo Frame <u>Not supported</u> Jumbo Frame Supported</p>	×	No transmission

Port Trunking

Port trunking (link aggregation) allows you to connect the TeraStation to two Ethernet ports for increased speed and reliability. Your hub or switch must support IEEE 802.1AX-2008 to use port trunking. Refer to the next page for instructions on configuring port trunking on the TeraStation.

The TeraStation supports the following port trunking modes:

Off: Port trunking is not used.

Round-robin policy * - Sets a round-robin policy for fault tolerance and load balancing.

Active-backup policy - Sets an active-backup policy for fault tolerance.

XOR policy * - Sets an XOR (exclusive-or) policy for fault tolerance and load balancing.

Broadcast policy - Sets a broadcast policy for fault tolerance.

Dynamic link aggregation * - Sets an IEEE 802.3ad dynamic link aggregation policy.

Adaptive transmit load balancing (TLB) - Sets a Transmit Load Balancing (TLB) policy for fault tolerance and load balancing.

* Configure your switch for the appropriate port trunking mode before configuring these modes on the TeraStation.

Important:

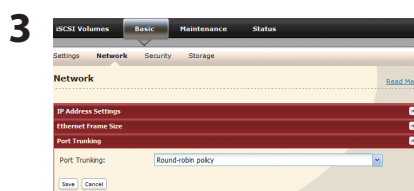
After configuring Port Trunking in Settings, reboot the TeraStation with the power button. If you fail to reboot it, network communication may become unstable.

Configuring port trunking on the TeraStation:

- 1 Connect TeraStation's LAN port 1 to a LAN port on your switch. If you've configured a port on the switch for port trunking, use that one. Do not connect the TeraStation's LAN port 2 yet.



Turn off iSCSI Service on the left side of Settings.



- 1 Navigate to *Basic - Network - Port Trunking*.
- 2 Click *Modify Settings*.



- 1 Select the items to configure for port trunking.
- 2 Click *Save*.

- 5 Turn iSCSI Service back on.

- 6 Connect TeraStation's LAN port 2 to a second LAN port on your switch. If you've configured another port on the switch for port trunking, use that one.

- 7 Press and hold the power button on the TeraStation for 3 seconds to turn it off. Press the power button again to power up the TeraStation.

Port trunking is now configured.

Update the TeraStation's Firmware

● Online Update

If a new firmware is available, the message "A new version of the firmware has been released. The current firmware can be updated to the latest version." is displayed when the TeraStation boots.

To update the firmware, open the TeraStation's settings and navigate to *System – Maintenance – Firmware Installation*. Click *Check for Update* to check the change log, then *Install Update* to update to the latest firmware.

Note:

Update notification will display "I52" on the LCD and a message on the login screen when an update is available. To disable update notification, click *Disable notification of updates*.

● Update by Downloading File from Buffalo's Web Site

You can also update the TeraStation's firmware manually. Visit www.buffalotech.com to download the latest TeraStation firmware updater. Double-click the file you downloaded to unzip it. The unzipped folder will include the program to update your TeraStation's firmware.

Chapter 8

List of Items in Settings

The following options can be set from Settings.

Common Items (left side of the screen)

Common Items (Displayed on the left side of the screen)	
iSCSI Service	Click <i>OFF</i> to stop the iSCSI service; <i>ON</i> to start it. Always stop the iSCSI service before creating or extending volumes.
Name	Displays the TeraStation's name.
Firmware version	Displays the TeraStation's firmware version number.
IP Address	Displays IP address of the TeraStation's LAN ports 1 and 2.
Place	Displays the Place from <i>Basic - Settings - Management Information</i> .
Manager	Displays the Administrator from <i>Basic - Settings - Management Information</i> .
Clients	Displays connected client
Locate TeraStation	Click to make the TeraStation beep.
Restart/Shutdown	To restart the TeraStation, click <i>Power Management</i> , then <i>Restart</i> . To turn off the TeraStation, click <i>Shut Down</i> under "Shutdown TeraStation".
Logout *	Log out of Settings.

* Displayed on the upper right of the screen

iSCSI Volumes

iSCSI Volumes		
iSCSI Volumes	iSCSI Volumes	<p>To add volumes, click <i>Create Volume</i>. To edit a volume, click a volume name. Select a volume and click <i>Delete Volume</i> to delete the volume. Click <i>Refresh</i> to update the volume information. Select a volume and click <i>Activate</i> will enable the iSCSI service for the selected volume. Select a volume and click <i>Inactivate</i> will disable the iSCSI service for the selected volume.</p> <p>Note: If the IP address of the computer is displayed in the iSCSI volume screen even though the iSCSI volume is not connected to the computer, enabling or disabling the iSCSI volume or LVM will fail. Turning off or disconnecting the computer without disconnecting the drive with iSCSI Connection Tool may cause this symptom. If this happens, connect the iSCSI volume with iSCSI Connection Tool after rebooting the computer, or stop the iSCSI service once and perform enabling/disabling operation of iSCSI Volume or LVM.</p>

Create Volume To display, click <i>Create Volume</i> on the Volume Configuration Screen.	Volume Name	Enter a name of the volume. * You can enter up to 12bytes (UTF-8). Do not use multi-byte characters. * Alphanumeric characters, and -(hyphen) may be used. * Do not use a number or symbol as the first character.
	Volume Description	Enter a description for the volume. * You can enter up to 75 bytes (UTF-8). * Alphanumeric characters, multi-byte characters, -(hyphen), _(underscore), and spaces may be used.
	Disk Area	Select hard disk space to create a volume.
	Size	Enter the volume capacity (size).
	Access Control	Click <i>Enable</i> for <i>Access Control</i> to apply Access Restrictions. You will be required to enter the user name and password you entered here when connecting with iSCSI Connection Tool. Select <i>Mutual Authorization</i> on the User Authorization screen upon connection when you have set the password in Password (Mutual Authentication). The screen to enter the mutual authentication password is displayed again. Enter the mutual authentication password you set and connect to the unit. To restrict access by IP address, click <i>Enable</i> for IP Address Restriction. Only IP addresses that are entered in the IP Address List are allowed access. Input parameters for IP address restrictions <ul style="list-style-type: none"> • Enter all IP addresses as 192.168.11.1,192.168.11.2. • Use commas to separate IP addresses. • You can simply type 192.168.11.1 if there is only one IP address. • All IP addresses will be allowed if nothing is entered. • Only entered IP address(es) are allowed to connect.
	Advanced Settings	Not supported. If you change settings here and can no longer connect to a volume, restore default settings and reconfigure.
LVM	Logical Volume Manager (LVM)	Selecting a drive and clicking <i>Enable LVM</i> will enable the Logical Volume Manager (LVM) for the selected drive. Selecting a drive and clicking <i>Disable LVM</i> will disable the Logical Volume Manager (LVM) for the selected drive.

Basic

Settings		
Name Click <i>Modify Settings</i> to change settings.	TeraStation Name	Enter a name to identify the TeraStation on the network. * You can enter up to 15 bytes (UTF-8). Do not use multi-byte characters. * Alphanumeric characters, and -(hyphen) may be used. * Do not use a symbol as the first character.
Management Information Click <i>Modify Settings</i> to change settings.	Place	Enter the location of the TeraStation * You can enter up to 75 bytes (UTF-8). * Alphanumeric characters, multi-byte characters, -(hyphen), _(underscore), and spaces may be used. * Do not use space as the first character.
	Manager	Enter the name of the computer's administrator. * You can enter up to 75 bytes (UTF-8). * Alphanumeric characters, multi-byte characters, -(hyphen), _(underscore), and spaces may be used. * Do not use space as the first character.
Date and Time Click <i>Modify Settings</i> to change settings.	Date/Time Source	Select <i>Automatic</i> to use NTP to set your system clock automatically. Select <i>Manual</i> to set the time manually.
	Primary NTP IP Address	Enter the DNS name or the IP address of an NTP server. Examples: ntp.jst.mfeed.ad.jp or 192.168.11.123 To specify ntp.jst.mfeed.ad.jp as the NTP server, select <i>Use default NTP server (ntp.jst.mfeed.ad.jp)</i> .
	NTP Synchronization Frequency	Select frequency to access the NTP server and adjust the time from <i>Daily</i> , <i>Weekly</i> , or <i>Every 3 hours</i> . If you access the NTP server through a proxy server, accessing the NTP server may fail in some network environments.
	Date	Displays year, month and date. Enter numbers to change these values.
	Time	Displays time. Enter numbers to change the value. To use your computers time, click <i>Use Local Date/Time</i> . For best results, use an NTP server to correct the clocks on your TeraStation and other network devices automatically.
	Time Zone	Select the time zone.
Language Click <i>Modify Settings</i> to change settings.	Display Language	Select the language to use.

Network		
<p>IP Address Settings</p> <p>Click <i>Modify Settings</i> to change settings.</p> <p>*The LAN cable connected to LAN port 2 should be set for Ethernet 2.</p>	DHCP	If a DHCP server is available, enable DHCP to assign IP addresses automatically.
	Primary IP Address	If not using DHCP, enter an IP address manually.
	Subnet Mask	Set a subnet mask.
	Default Gateway Address	Specify the IP address if the default gateway if it exists.
	Primary DNS Server	Specifies an IP address for the primary DNS server.
	Secondary DNS Server	Specifies an IP address for the secondary DNS server.
<p>Ethernet Frame Size</p> <p>Click <i>Modify Settings</i> to change settings.</p> <p>*The LAN cable connected to LAN port 2 should be set for Ethernet 2.</p>	Ethernet Frame Size	<p>You can improve data transmission speed by increasing the maximum amount of data that can be sent at once.</p> <ul style="list-style-type: none"> • 1518 bytes (Default) • 4102 bytes (Jumbo Frame) • 7422 bytes (Jumbo Frame) • 9694 bytes (Jumbo Frame)
<p>Port Trunking</p> <p>Click <i>Modify Settings</i> to change settings.</p>	Port Trunking	<p>Set this option to connect 2 Ethernet ports to the TeraStation. The following settings are available:</p> <ul style="list-style-type: none"> • <i>Off</i>: Port trunking is not used. • <i>Round-robin policy</i>: Sets a round-robin policy for fault tolerance and load balancing. • <i>Active-backup policy</i>: Sets an active-backup policy for fault tolerance. • <i>XOR policy</i>: Sets an XOR (exclusive-or) policy for fault tolerance and load balancing. • <i>Broadcast policy</i>: Sets a broadcast policy for fault tolerance. • <i>Dynamic link aggregation</i>: Sets an IEEE 802.3ad dynamic link aggregation policy. • <i>Adaptive transmit load balancing (TLB)</i>: Sets a Transmit Load Balancing (TLB) policy for fault tolerance and load balancing.

Security		
Administrator Settings Click <i>Modify Settings</i> to change settings.	Username	You may change the admin account's username. * You can enter up to 20 bytes (UTF-8). Do not use multi-byte characters. * Alphanumeric characters, and -(hyphen) may be used. * Do not use a symbol as the first character.
	Password	Change the admin password. * You can enter up to 20 bytes (UTF-8). Do not use multi-byte characters. * Alphanumeric character and the following characters may be use: - _ @ ! # \$ % & ' () * + , . / ; < > = ? ^ { } ~ * Do not use a symbol as the first character.
	Confirm Password	Re-enter the new admin password for confirmation.
Access Control (Whole System) Click <i>Modify Settings</i> to change settings.	Access Control	Select whether or not to apply access restrictions to the TeraStation. If you apply access restrictions, you will be required to enter a user name and password to connect with iSCSI Connection Tool.
	Mutual Authentication	Set when mutually authenticating.
	Username	Enter a username for access restrictions.
	Password	Enter a password for access restrictions.
	Password (Mutual Authorization)	Set the password for mutual authentication.
HDD Connection Tool Click <i>Modify Settings</i> to change settings.	iSCSI HDD Connection Tool	Set whether or not to replying to a query from iSCSI Connection Tool. Selecting <i>Do not reply</i> will prevent you from using iSCSI Connection Tool.

Storage		
Disks	Format Disk	<p>Formatting a drive or array will erase all volumes on the drive or array. After formatting a disk from Settings, you must allocate a partition and format it before it is usable. Use Disk Management on Windows to allocate a partition and format it.</p> <p>Checking <i>Encryption</i> before formatting encrypts the drive or array with 128 bit AES encryption. Only the TeraStation will be able to read the disk after that. To unencrypt the hard drive, uncheck <i>Encryption</i> and format it again.</p>
	Remove Disk	<p>Before physically removing a drive from the TeraStation, select the drive and click <i>Remove Disk</i> to dismount the disk. It's then safe to remove it.</p>
	Rediscover Disk	<p>After dismounting and removing a disk, click here to have the TeraStation recognize a replacement drive without restarting the TeraStation.</p>
RAID Array	RAID Array	<p>By default, the TeraStation is in RAID 5 mode. You may configure any of the following RAID modes: RAID 5, RAID 1, RAID 10, and RAID 0.</p> <p>To configure a RAID array, check the hard drives to use, select RAID mode, and click <i>Create RAID Array</i>.</p> <ul style="list-style-type: none"> • To build a RAID 1 array, check 2 drives. • To build a RAID 10 or RAID 0 array, check all drives. • To build a RAID 5 array, check 3 or 4 drives. • To delete an array, click <i>Delete RAID Array</i>. <p>Changing RAID modes will erase all data on the array. Back up any important data before changing the RAID mode.</p> <p>If you have a leftover drive after building a RAID 5 array with 3 drives, or a RAID 1 array, it can be set as a hot spare by clicking <i>Set to spare-disk</i>. Click <i>Set to normal disk</i> to change it back to a normal drive.</p> <ul style="list-style-type: none"> • <i>RAID Array Error Detection Response:</i> With a RAID 1, RAID 5, or RAID 10 array, you may choose to have the system shut down automatically if an error is detected. This feature is not available for RAID 0 arrays or disks in normal mode. By default, this is set to <i>Shut Down</i>. • <i>Boot with iSCSI service:</i> After an error occurs, the iSCSI service may be enabled or disabled at the next boot. By default, it will be enabled. • <i>RAID Array check speed:</i> Select the speed of the RAID Scan from the following: <i>High:</i> 10 hours per 1 TB RAID Array <i>Normal:</i> 20 hours per 1 TB RAID Array <i>Low:</i> 100 hours per 1 TB RAID Array

<div>RAID Scanning</div> <div>Click <i>Modify Settings</i> to change settings.</div>	RAID Scanning	<p>A RAID scan read checks all sectors in the data area of drives in an array. If a bad sector error is found during the scan, it is repaired automatically. Note that some kinds of errors are repaired automatically by the array even without a RAID scan.</p> <table><tr><th>Status</th><th>Descriptions</th></tr><tr><td>repair possible</td><td><ul style="list-style-type: none">Read error in the data area which are build in RAID 1, 5, or 10 (including RAID 1 system array.)</td></tr><tr><td>impossible to repair</td><td><ul style="list-style-type: none">Write ErrorRAID management area errorDrive partition information area errorDrive recognition failure, etc.</td></tr></table> <p>• If many repairable errors are found in one of hard drive which build RAID, that drive is removed from the RAID, the system will automatically move to degraded mode. The system will continue to function, but data is not protected in degraded mode, so it is strongly recommended to immediately replace the erroneous hard drive.</p> <p>• When running RAID Scanning for the first time, it is strongly recommended to back up your data on TeraStation in advance.</p> <p><i>RAID Scanning:</i> Set whether using RAID Scanning or not.</p> <p><i>RAID Scanning Schedule:</i> Select the schedule to perform RAID Scanning.</p> <ul style="list-style-type: none">• <i>Every Week</i>, and from <i>Sunday</i> to <i>Saturday</i>• <i>1st</i>, and from <i>Sunday</i> to <i>Saturday</i>• <i>2nd</i>, and from <i>Sunday</i> to <i>Saturday</i>• <i>3rd</i>, and from <i>Sunday</i> to <i>Saturday</i>• <i>4th</i>, and from <i>Sunday</i> to <i>Saturday</i>• <i>1st, 3rd</i>, and from <i>Sunday</i> to <i>Saturday</i>• <i>2nd, 4th</i>, and from <i>Sunday</i> to <i>Saturday</i>• <i>Every 1st day/month</i> <p>Select <i>Begin Immediate RAID Scan</i> and click <i>Save</i> to immediately run RAID Scanning.</p> <p><i>RAID Scanning Start Time:</i> Select the time to start RAID scans from 0 to 23 o'clock. To stop a RAID scan, click <i>Abort RAID Scanning</i>.</p>	Status	Descriptions	repair possible	<ul style="list-style-type: none">Read error in the data area which are build in RAID 1, 5, or 10 (including RAID 1 system array.)	impossible to repair	<ul style="list-style-type: none">Write ErrorRAID management area errorDrive partition information area errorDrive recognition failure, etc.
	Status	Descriptions						
	repair possible	<ul style="list-style-type: none">Read error in the data area which are build in RAID 1, 5, or 10 (including RAID 1 system array.)						
	impossible to repair	<ul style="list-style-type: none">Write ErrorRAID management area errorDrive partition information area errorDrive recognition failure, etc.						

Maintenance

Maintenance		
<p>Email Notification</p> <p>Click <i>Modify Settings</i> to change settings.</p> <p>Click <i>Send Test Message</i> to send a test email to the email address which has been set.</p>	Notification	Select whether using Email notification feature or not.
	SMTP Server Address	Enter mail server address in SMTP Server Address field.
	SMTP Port No.	Enter SMTP Port No. If this is left blank, the standard port number (25) is used. If Authentication Type is set to <i>Disabled</i> or <i>POP before SMTP</i> , then port 25 is used regardless of the number entered in this field.
	Authentication Type	Select from <i>POP before SMTP</i> , <i>LOGIN (SMTP-AUTH)</i> , or <i>CRAM-MD5(SMTP-AUTH/CRAM-MD5)</i> .
	POP3 Server Address	Enter mail server address in POP3 Server Address field.
	POP3 Port No.	Enter POP3 Port No. If this is left blank, the standard port number (110) is used.
	SSL/TLS	When <i>LOGIN (SMTP-AUTH)</i> or <i>CRAM-MD5 (SMTP-AUTH/CRAM-MD5)</i> are selected for Authentication Type, specify either <i>SSL</i> or <i>TLS</i> .
	Username	Enter the username for authentication.
	Password	Enter the password for authentication.
	Subject	Specify the subject line that emails will be sent with. Use alphanumeric characters only. Do not use multi-byte characters.
	Recipient(s)	Enter the email address of the recipient, and click <i>Add</i> . You can register up to 5 email addresses as recipients.
	Report	<p>Select the contents for email notifications.</p> <ul style="list-style-type: none"> • <i>HDD Status Report</i> Sends the condition of the hard drives at the specified time on HDD Status Report. • <i>Fan Failure</i> Sends when the fan error is recognized. • <i>Disk Error</i> Sends when the hard drive error is recognized. • <i>System Alert</i> Sends when system is rebooted or shut down, or RAID configuration is changed.
<p>Syslog</p> <p>Click <i>Modify Settings</i> to change settings.</p>	Syslog	You may select to send logs to a syslog server. Select <i>Enable</i> for Syslog Transfer, enter the IP address of the syslog server in Syslog Server IP Address field, and select <i>Save</i> to transmit logs to a syslog server.

Alert Sound Settings Click <i>Modify Settings</i> to change settings.	Alert Sound Settings	Beep alerts can be triggered by the following conditions : <i>Overheating, Disk Error, Fan Error, and UPS power Error.</i>
Front Panel Settings Click <i>Modify Settings</i> to change settings.	Display	Select items to display on LCD display at the front of the TeraStation from <i>Host IP, Disk Mode, and Time.</i>
	Flip Display Items	Set if automatically switching the item to display on the LCD or not.
	LCD brightness	Adjust backlight brightness of the LCD display in 5 levels.
	LED brightness	Adjust the brightness at the front of the TeraStation in 5 levels.
	LED Synchronization	Select whether using the feature to change the LED brightness synchronized with time. For example, you can change the brightness on day time and night time.
	LED brightness (Sleep)	Adjust the brightness of LED in 4 levels while in dark.
	Begin Sleep	Set the time (0 to 23 o'clock) to darken LED brightness. This can be set in every 00 minute at 1 hour interval.
	Wakeup	Set the time (0 to 23 o'clock) to change LED brightness back to the normal setting. This can be set in every 00 minute at 1 hour interval.
Firmware Installation		Clicking <i>Check For Update</i> will check for the latest firmware version. If the installed firmware version is not the latest, click <i>Install Update</i> to update the firmware. Update notification will display "I52" on the LCD and a message on the login screen when an update is available. To disable update notification, click <i>Disable notification of updates.</i>
Power Management		
UPS Settings Click <i>Modify Settings</i> to change settings.	Synchronization with UPS	<i>synchronize with UPS connected to this TeraStation:</i> Select to synchronize the TeraStation with a UPS that is directly connected. <i>synchronize with UPS connected to other TeraStation on the network:</i> Select to synchronize the TeraStation with a UPS that is connected to a different TeraStation on the same network. <i>do not synchronize with UPS:</i> Select if synchronizing to a UPS is not desired.
	Synchronized source TeraStation IP Address	If <i>synchronize with UPS connected to other TeraStation on the network</i> is selected, enter the IP address of the TeraStation that is directly connected to the UPS.
	UPS Connection Type	Select a connection method for the UPS. • <i>USB Port (APC Style) or USB Port (OMRON Style)</i> can be set only when you are using USB type UPS manufactured by APC.
	TeraStation behavior When Power failure	You may set how long the TeraStation runs after a power failure before it shuts down. Or, you can set it to shut down when the UPS signals <i>Battery Low</i> . "Low Battery" shutdown is only supported with UPSs that are connected to the TeraStation via USB. You can also set the TeraStation to shut down when the number of iSCSI connections becomes 0 (zero).
	UPS Behavior After TeraStation has shut down	You may also select to have the UPS shut down after the TeraStation shuts down.
	UPS Recovery function	Enable to have the TeraStation reboot automatically when normal AC power is restored.
Restart TeraStation	Restart	Click <i>Restart</i> to reboot the TeraStation.
Shutdown TeraStation	Shutdown	Click <i>Shut Down</i> to turn off the TeraStation. To turn it back on, press the power button on the front of the unit.

Restore/Erase		
Restore Factory Defaults	Restore TeraStation	<p>Click <i>Restore TeraStation</i> to initialize the following settings: TeraStation Name, NTP Settings, RAID Scanning, Upon restore, Email Notification Settings, UPS Settings, Administrator Settings, Network Settings (IP Address, Subnet Mask, etc.), Alert Sound Settings, Front Panel Settings, RAID Array Failure Settings, Management Information, Languages Settings, Syslog</p> <p>You may choose to not initialize the admin username and password when other settings are initialized from the front panel button. Click <i>Modify Settings</i> to change this setting. If you select <i>Keep current admin password</i>, you will not be able to make any further changes to the settings of the TeraStation without the admin username and password. Write them down and do not lose them!</p>
Erase	Erase	Clicking <i>Erase</i> will erase data on the drives on the TeraStation completely. All data and settings will be lost. Back up any important data before! You cannot change the configuration of the TeraStation while erasing data.

Ping Test		
Ping Test	Ping Test	Enter the target IP Address in Target IP Address, and click <i>Ping</i> . The response is displayed in Result.

Status

System		
System	System Information	Displays TeraStation Name, Model Name, Firmware version, NTP, Date and Time, Time Zone, Email Notification, Fan Status, etc.
Network		
Network	Network Information	Displays MAC Address, IP Address, Subnet Mask, Ethernet Frame Size, Primary DNS Server, Secondary DNS Server, Default Gateway Address, Port Trunking, etc.
Connection History		
Connection History	Connection History	Displays Date/Time, Status, Volume Name and "Initiator Name.

Appendix

Default Settings

The following settings are factory defaults for the TeraStation.

Username	admin
Password	password
DHCP Client	Normally, the TeraStation will get its IP address automatically from a DHCP server on the network. If no DHCP server is available, then an IP address will be assigned as follows: IP Address: 169.254.abc.abc (abc is assigned randomly when booting the TeraStation). Subnet Mask: 255.255.0.0
Ethernet Frame Size	1518 bytes
NTP	Automatic
RAID Mode	RAID 5 mode (4 hard drives)

Note:

To restore factory defaults, refer to “Initializing Settings” on page 39.

Specifications

Check www.buffalotech.com for information about the latest products and specifications.

Interface (LAN Port)	<p>Interface: Complied with IEEE802.3ab (1000BASE-T) Complied with IEEE802.3u (100BASE-TX) Complied with IEEE802.3 (10BASE-T)</p> <p>Transfer speed: 1000 Mbps Full duplex (auto-negotiation) 100 Mbps Full duplex/Half duplex (auto-negotiation) 10 Mbps Full duplex/Half duplex (auto-negotiation)</p> <p>Number of ports: 2 port (supports AUTO-MDIX)</p> <p>Connector type: RJ-45 8-pin</p> <p>Protocol: TCP/IP</p> <p>Jumbo Frame : 1518/4102/7422/9694 bytes (Including 14 bytes of the header and 4 bytes of FCS)</p>
Interface (USB Port)	<p>Port: TS-IXL: USB 2.0 port (Series A) × 2 TS-RIXL: USB 2.0 port (Series A) × 3</p> <p>Compatible USB devices: UPS manufactured by Omron or APC</p> <p>Note: Only UPS products connected via USB are supported.</p>
Interface (UPS Port)	<p>Interface: UPS Port (D-SUB 9 pin (Male)) × 1</p> <p>Compatible UPS: UPS manufactured by Omron or APC</p> <p>Note: Compatible UPS products are provided on the Buffalo Technology website. The Omron website also provides descriptions on each product page. Be sure to check this information before purchasing a UPS.</p>
Internal Hard Drive	<p>Drive configuration: By default, a RAID 5 array using all drives.</p> <p>Note: If a hard drive in the TeraStation malfunctions, replace it with a Buffalo Technology OP-HD series drive of the same capacity, available from www.buffalotech.com.</p>
Power / Power Consumption	<p>TS-IXL: AC 110 - 240 V, 50/60 Hz, max ~86 W</p> <p>TS-RIXL: AC 110 - 240 V, 50/60 Hz, max ~140 W</p>
Dimensions (W×H×D) / Weight	<p>TS-IXL: 170 × 215 × 230 mm; 6.7 × 8.5 × 9.1 in. (excluding protruding parts) / ~8 kg (17.7 lb.)</p> <p>TS-RIXL: 430 × 45 × 420 mm; 16.9 × 1.8 × 16.5 in. (excluding protruding parts) / ~9 kg (19.9 lb.)</p>
Operating Environment	<p>Temperature: 5 - 35° C; 41 - 95° F</p> <p>Humidity: 20 - 80% (no condensation)</p>
Compatibility	<p>Windows computers with Ethernet interface.</p> <p>The TeraStation requires an Ethernet connection with your computer for operation. It cannot be connected via USB.</p>
Supported OS	<p>Windows 8*, Windows 7*, Vista*, Windows XP*, Windows 2000, Windows XP MCE 2005, Windows XP MCE 2004, Windows Server 2003, Windows Server 2008, Windows 2000 Server</p> <p>* Supports both 32-bit and 64-bit versions.</p>

Backup

Back up your data! Even the most reliable NAS device may lose data from a sudden drop or just the passage of years. Your data should always be backed up to another location. Buffalo external hard drives like the DriveStation series make it simple to back up your data. Don't wait until it's too late!

GPL Information

The source code for Buffalo products that use GPL code is available at <http://opensource.buffalo.jp/>.

Compliance Information

FCC Warning

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

CE Mark Warning

CE Mark Warning

This is a Class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

Environmental Information

- The equipment that you have purchased required the extraction and use of natural resources for its production.
- The equipment may contain hazardous substances that could impact health and the environment.
- In order to avoid the dissemination of those substances in our environment and to diminish the load on natural resources, we encourage you to use the appropriate take-back systems.
- The take-back systems will reuse or recycle most of the materials of your end of life equipment appropriately.
- The crossed-out wheeled bin symbol invites you to use those systems.
- If you need more information on the collection, reuse and recycling systems, please contact your local or regional waste administration.



KC

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